YASKAWA

# MACHINE VISION SYSTEM
# MYVIS

## MYVIS Clearly Makes a Difference.

Lets You Build a Truly Superior Positioning System

Certified for
ISO9001 and
ISO14001

JQA-0422 JQA-EM0202

The MYVIS is a high-performance vision system that combines advanced image processing technologies with many of the servo-control technologies accumulated by Yaskawa over the years as a pioneer in the field of servo drives.
With a new line of MYVIS products, more versatile applications are now possible.

# LINEUP

## Standalone type: Three models

① JEVSA-YV250 unit
for 100-VAC power supply

② JEVSA-YV250-E unit with
CE marking for 24-VDC power supply

③ JAVSA-YV250S board:
Requires 5-VDC power supply for board and 12-VDC power supply for cameras

● Applicable monitors
VGA (B/W image and color graphic) or NTSC (B/W)

## PCI-bus type: JAVSA-YV250P-E model

- 5-VDC power supply from PCI bus and 12-VDC power supply for cameras
- Four boards can be mounted in a personal computer, so 16 cameras can be connected.

## High-speed, High-precision Image Processing

- Instant Alignment (Positioning with No Retries Required)
- Non-stop Alignment

➡ P3

- Advanced, High-speed Gray Scale Pattern Matching
- High-speed Binary Blob Analysis
- Subpixel Detection for High-resolution Processing
- Template Masks to Ignore Areas that Vary

➡ P4

- Ambiguous Mark Detection
- Detection of Positioning Marks of Any Shape

➡ P5

## Enhanced Hardware Processing

- Captures Images from Two Cameras Simultaneously
- Supports with Double-speed Scan Cameras ➡ P5
- Supports Cameras with External Trigger Shutter
- Supports Full-frame Shutter Cameras
- Supports both External and Internal Camera Sync Modes
- Captures New Images to Separate Frame Memory while Processing Previous Images

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- Memory Capacity Holds up to 48 Images.
(For use in managing NG images and saving raw images from multiple cameras.)
- Input Image Lookup Table
(Brightness Conversion or Black/White Reversal during Image Capture)

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- Image Freeze Display (Displays One Image from a Specified Camera)
- Variety of Monitor Display Modes ➡ P5
(Image capture: Composite, mirror, and simultaneous reduction)

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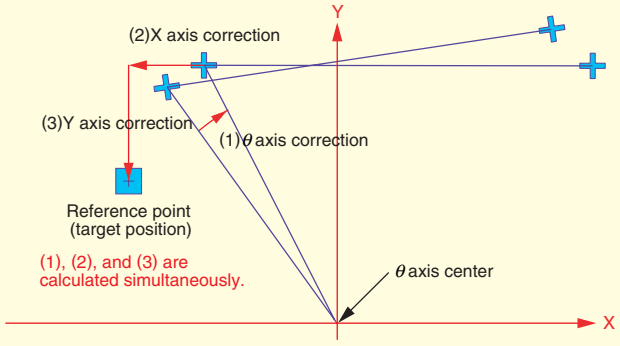
# Instant Alignment ( Positioning with No Retries Required )

## Precise Positioning with Single Image Capture

The MYVIS positioning application software that is supported by Yaskawa considers total servo motion. The present positions of the servo's axes are constantly obtained and images are processed using the servo coordinates. This means that even if the center of the $\theta$ axis should move in the X- and Y-axis directions, accurate $\theta$ axis center coordinates are determined to achieve the target precision with a single positioning correction.

### Basic Positioning Calculation

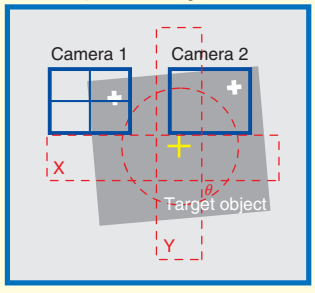
As shown in figure at right, two alignment mark coordinates are used to perform the calculation in units of servo axis movement.
The inclination from the center of the $\theta$ axis is corrected to move the mark to the reference point (target position).



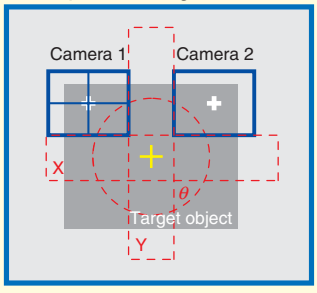

Example :

In the figure at right, the left mark is being centered in the search area of the left-side camera (camera 1). This enables various combinations of processing, including processing center position of the marks and processing with four cameras.

Before positioning correction



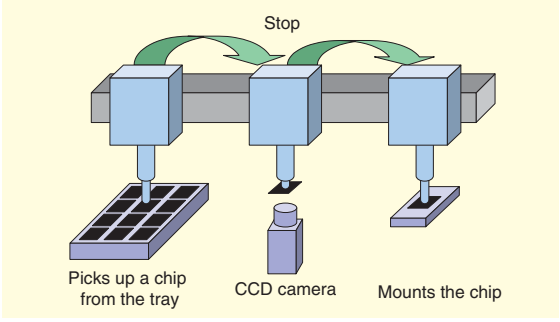

After positioning correction



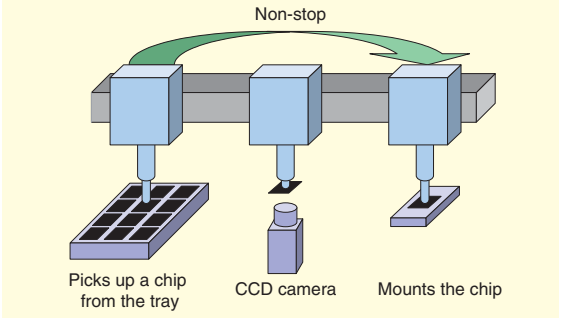

# Non-stop Alignment

In contrast to a system where the target object stops in front of the camera for processing, this system shortens the overall mount time with non-stop processing.

3.0-second Cycle Time
(Object stops in front of camera.)




1.5-second Cycle Time
(Object does not stop in front of camera.)




## System Outline

- Equipment
  MP2300 Machine Controller, Σ-Ⅲ Series Servomotor, MYVIS YV250 Machine Vision System, halogen light illumination, XC-HR50(Double-speed, non-interlaced scan camera)
- Specifications
  Move speed: 1,000 mm/s; camera shutter speed: 1/16,000 s; field of view: 20 mm
- Image processing time: Image capture (16.7 ms) + image processing (5 ms) + data output (3 ms) = 24.7 ms
- Positioning correction accuracy = 10 $\mu$m
- Time chart (refer to page 5)

# High-speed Processing

## Gray Scale Pattern Matching

English version will be available soon.

An originally developed ASIC and search algorithm enable high-speed, highly accurate position detection.

The photo on the right shows an example of detecting the position of the alignment mark on the LCD glass substrate.

- Search area : 640×480 (full field of view)
- Template size : 110×110 pixels
- Search time : 5 ms

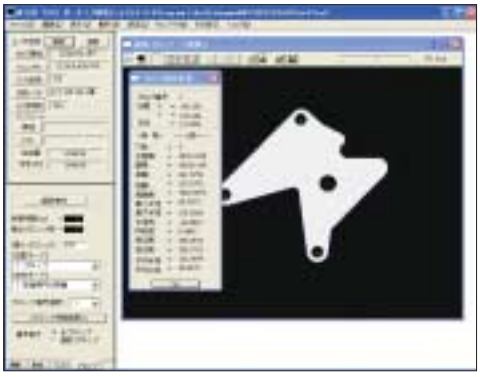
## Binary Blob Analysis

English version will be available soon.

An originally developed ASIC enables high-speed processing by creating binary data while capturing an image.

The photo on the right shows an example of the blob analysis results.

- Analysis area : 640×480 (full field of view)
- Number of blobs : 5
- Analysis time : 3 ms



Data obtained by blob analysis

- Blob center of gravity
- Blob orientation
- Shape features
- Average gray level for each blob, etc.

**Terminology**

Feature values : This refers to geometric features such as area, perimeter length, number of holes, angle of axes of inertia, center of gravity coordinates, edge point coordinates, roundness, and minimum/maximum radius.

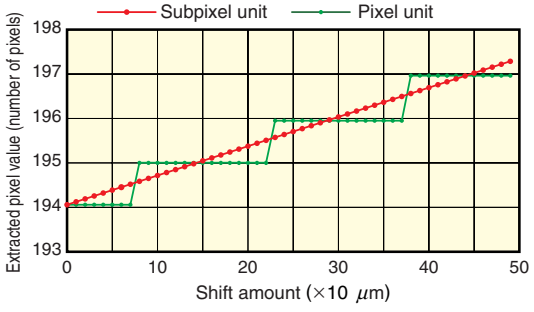
Blob analysis : A number is assigned to a single shape formed from a black or white mass, and then the information obtained from each mass is analyzed. In the field of image processing, these masses are called “blobs”. Feature values are calculated from these numbers. In the test photo, there are one white blob (large white mass) and four black blobs (round holes).

# High-precision Processing

## Subpixel Detection for High-resolution Processing

The graph at right shows the measurement data for subpixel and pixel units when the detection mark has been shifted about three pixels. While the pixel unit changes in a step-like pattern for each pixel, the subpixel unit changes linearly. Turning on the subpixel detection mode raises the resolution, for linear detection results. This provides an effective precision of 1/5 to 1/10 of the usual pixel unit.

Test Results of MYVIS Subpixel Detection Mode

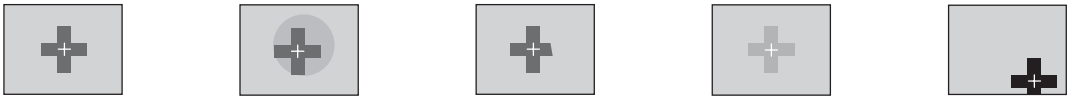



## Position Detection Using a Template Mask

The template mask can be set to accurately detect marks in which the appearance varies. The photo at right shows a template being used on the center of the round mark, and a test with a mark that has a center with a different appearance. Since the perimeter of the mark can be accurately imaged, ignoring the masked part, precise center coordinates can be detected.

## Ambiguous Mark Detection

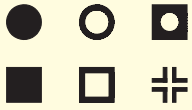
Accurate positioning is possible even when the appearance of a mark changes. The figure below shows an example. Ask your Yaskawa representative or local dealer for details on using the MYVIS in various applications.

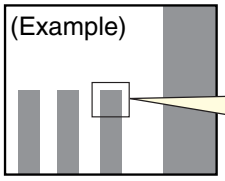


Where areas differ sharply in contrast | Where an image is visible in the background | Where part of the mark is missing | Where there is little contrast | Where the mark slips out of the field of view

## Detection of Positioning Marks of Any Shape

Typical marks






When there is no mark, you can substitute a pattern.

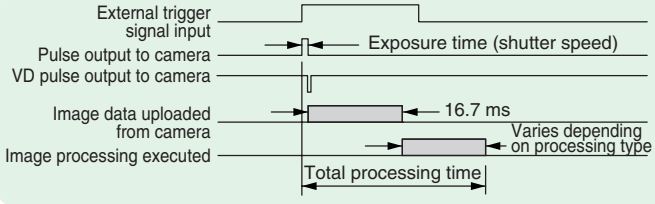
Register the top part as a pattern, and instruct the system to detect the rightmost pattern.

# Enhanced Hardware Processing

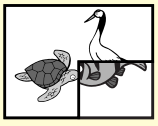
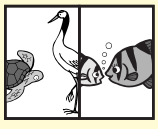
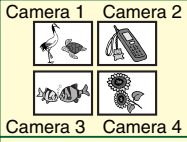
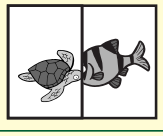
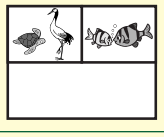
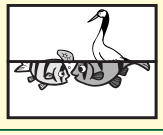
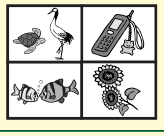
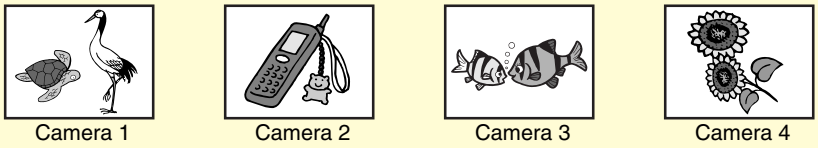
## Built-in Hardware to Simplify Use of Special Cameras

A timing chart for non-stop alignment when using a double-speed XC-HR50 camera is shown on the right.

If an external trigger signal is input, the MYVIS outputs a shutter trigger pulse to the camera. After the image has been exposed for the set amount of time, a Vertical Drive (VD) signal is output and the image is captured.
If using a Yaskawa MP controller with an LIO-01 module, no sensor for the external trigger is required, and you can select any position as the destination for the trigger signal.




## Various Monitor Display Modes

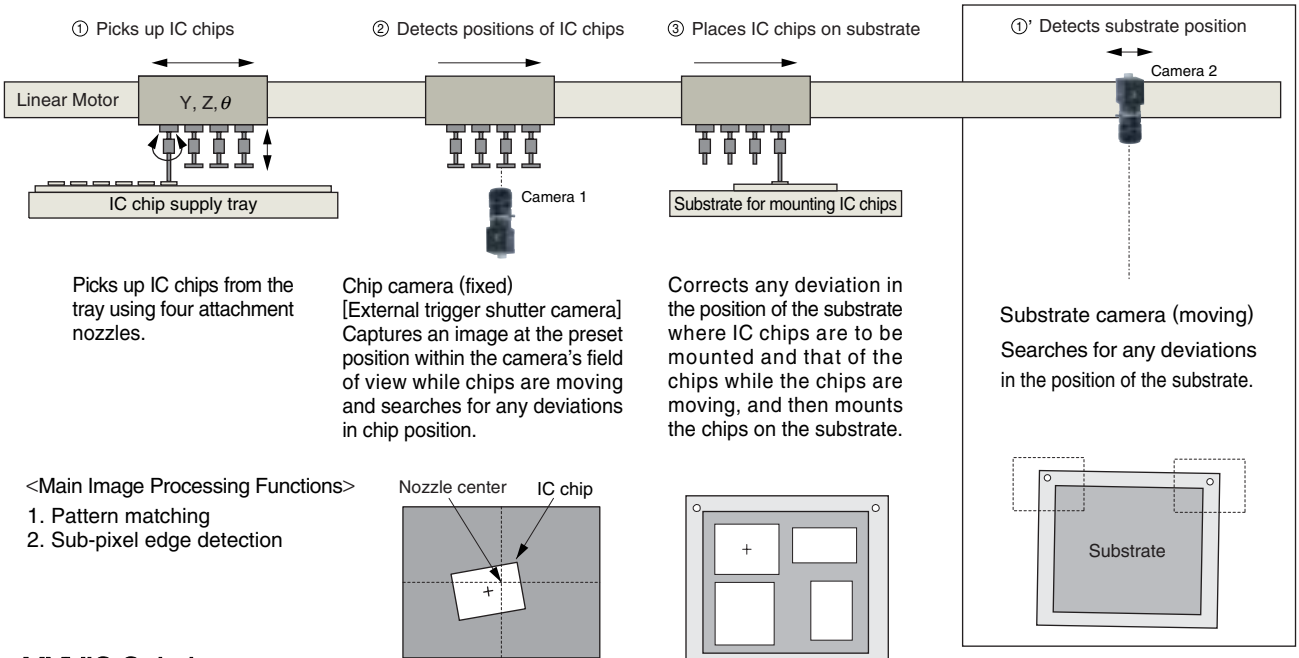
| Type | Monitor Display | Description | Type | Monitor Display | Description |
|---|---|---|---|---|---|
| Full Screen | | Ordinary screen. | 3/4 Screen* |  | A separate image is displayed in the lower right quadrant. |
| Side by Side1* |  | The center portions of two camera images are shown side by side. | Mirror Mode |   | Reversed images are displayed from a pair of cameras, cameras 1 and 2 or 3 and 4. (On the left, cameras 1 and 2 are in mirror mode.) |
| Side by Side2* |  | The left half of one camera image and the right half of another are shown side by side. | Simultaneous Image Display (Two Images) |  | The image from each camera is reduced to 1/4 and displayed in real time. This is convenient for applications viewing multiple camera images simultaneously. |
| Up and Down* |  | The upper half of one camera image and the lower half of another are shown vertically. | Simultaneous Image Display (Four Images) |  | |
| Images from Each Camera |   | | | | |

*: Since the images in Side by Side, Up and Down, and 3/4 Screen are handled in the same manner as a single camera image, the image processing time is reduced.

# Example 1: Non-stop alignment for a substrate chip mounter *

*: A device for mounting multiple chips onto a single substrate.
Models with different numbers of nozzles are available.

## Application Outline




Picks up IC chips from the tray using four attachment nozzles.

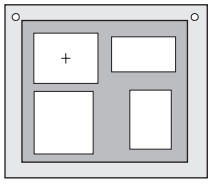
Chip camera (fixed)
[External trigger shutter camera]
Captures an image at the preset position within the camera's field of view while chips are moving and searches for any deviations in chip position.

Corrects any deviation in the position of the substrate where IC chips are to be mounted and that of the chips while the chips are moving, and then mounts the chips on the substrate.

Substrate camera (moving)
Searches for any deviations in the position of the substrate.

<Main Image Processing Functions>
1. Pattern matching
2. Sub-pixel edge detection



## MYVIS Solutions

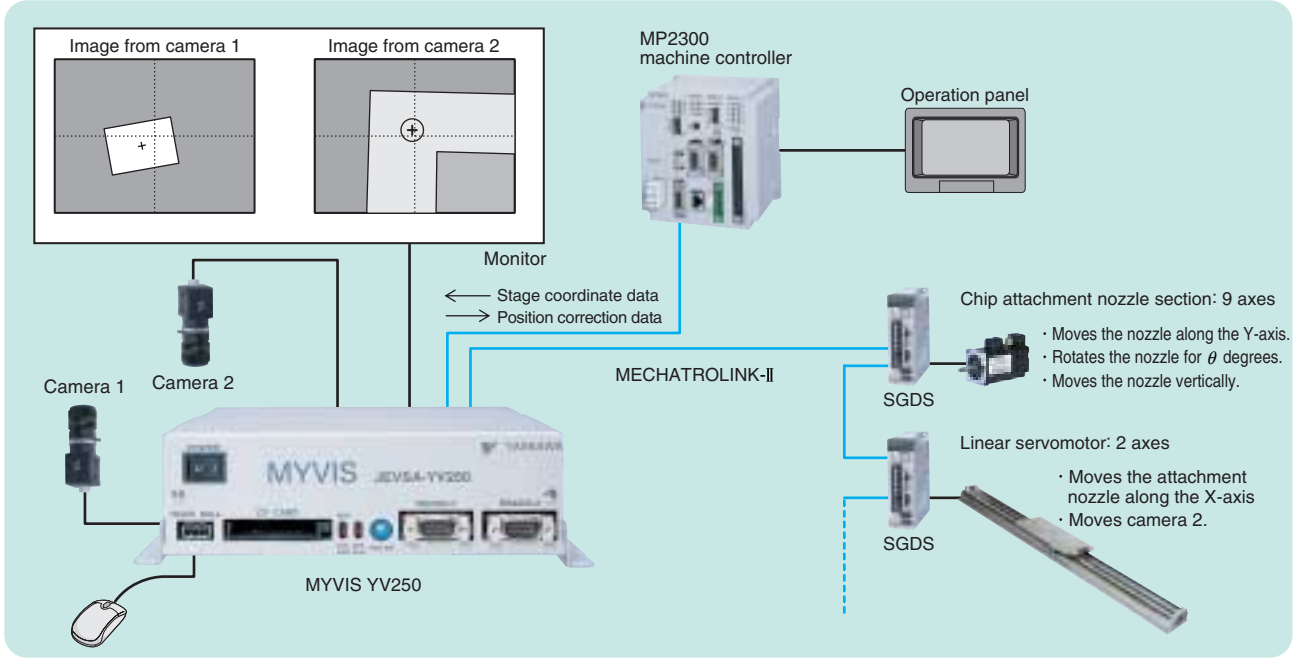
1 Non-stop alignment
The image is captured and the offset is calculated while the chip is in motion, so there is no need to stop the machine.

2 By using the automatic calibration tool, the coordinates of the moving stage can be in agreement with the coordinates of the detected image. That is to say, the coordinates obtained by image processing become the absolute coordinates of the machine system.
Note: By using MECHATROLINK-Ⅱ communications, the MYVIS can also receive the current position values of the servo axes while processing the data at high speeds.

3 External trigger shutter cameras supported
The image of fast-moving object can be captured at the preset position within the camera's field of view with no deviation. (Cameras for non-interlaced scanning are used to read all pixels.)

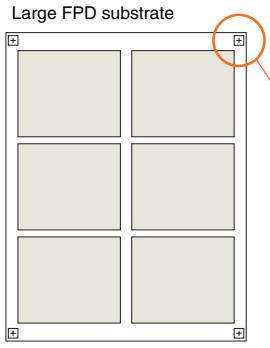
4 High-precision subpixel detection mode (template matching)
Detects positions with an effective precision of 1/5 to 1/10 of a pixel.

## System Configuration



# Example 2: Four-image alignment for a large FPD substrate

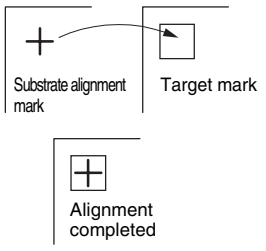
## Application Outline




FPD: Flat Panel Display
[Liquid Crystal Display (LCD), Plasma Display Panel (PDP), etc.]

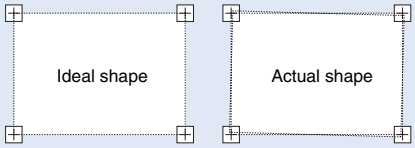
Devices that Commonly Use 4-image Alignment

- Silk screen printing machines
- Exposure machines
- Board laminating machines




### Average Processing

Ideally speaking, the four positioning marks should form a perfect rectangle and should match perfectly when overlaid. In reality, looking at a large substrate that is a meter or more on one side on a micron level shows that it is not a parallelogram or even a trapezoid, but rather an irregular rectangle. Since it is not possible for the four points to form a perfect rectangle, average processing is used. The method used for average processing depends on the application specifications.




## MYVIS Solutions

1 High-precision subpixel detection mode (template matching)
Detects positions with an effective precision of 1/5 to 1/10 of a pixel.

2 Linking with motion controller
High-precision corrections can be calculated by constant positioning mark detection with a mechanical coordinate system.

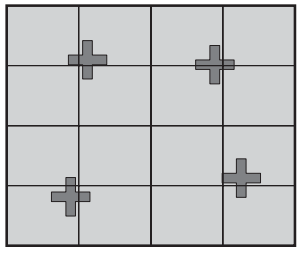
3 Shortened cycle times
Using simultaneous image captures, images from four cameras can be captured in the time normally required for two cameras.

4 A variety of alignment software is available for FPD panel fabrication.

5 Images from four cameras can be displayed in real time.

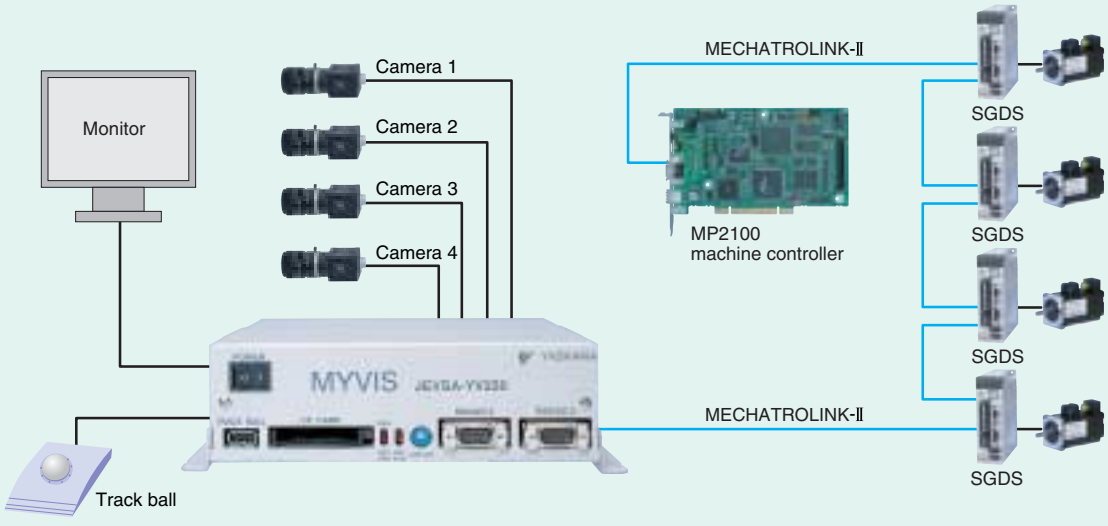
6 VGA monitors can display 16-color graphics and gray image.

MYVIS Screen Design Example
[ Simultaneous Image Display (Four Images)]



### Comparison of Image Capture Times

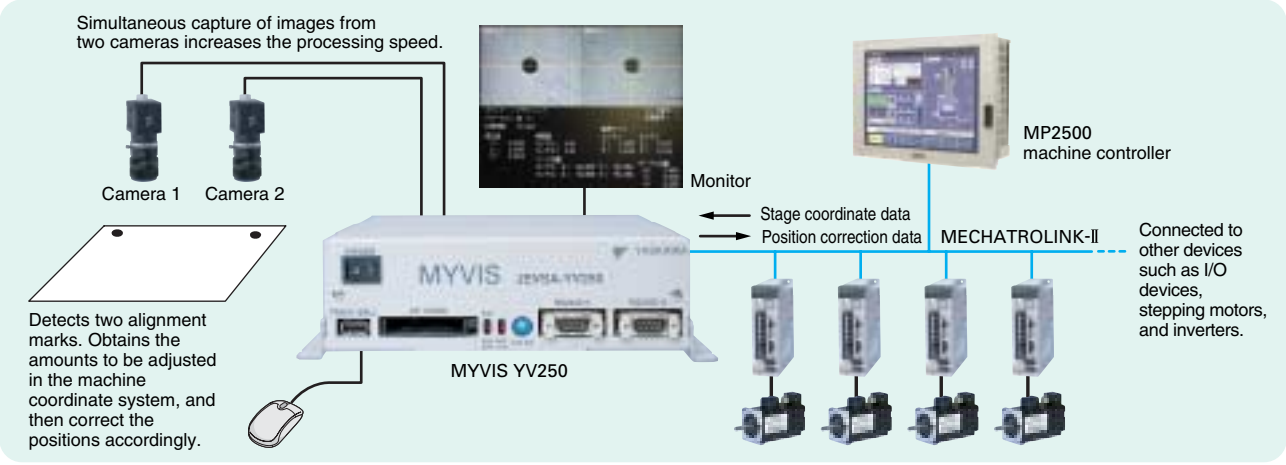
## System Configuration



# Standalone MYVIS System with MECHATROLINK-Ⅱ Communications

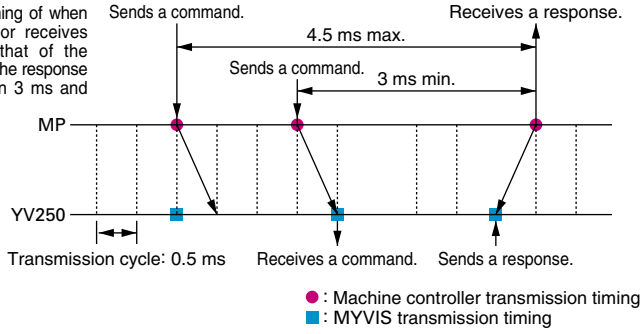
With MECHATROLINK-Ⅱ communications, the MYVIS can receive the current position data from several connected servomotors at a time. The MYVIS calculates the machine coordinates using the real-time data to ensure accurate positioning.

## System Configuration


Simultaneous capture of images from two cameras increases the processing speed.
Camera 1
Camera 2
Monitor
MP2500 machine controller
Stage coordinate data
Position correction data
MECHATROLINK-Ⅱ
Connected to other devices such as I/O devices, stepping motors, and inverters.
MYVIS
MYVIS YV250
Detects two alignment marks. Obtains the amounts to be adjusted in the machine coordinate system, and then correct the positions accordingly.

Machine controllers in the MP2000 series automatically recognize the devices linked by MECHATROLINK communications and allocate registers according to the functions of each device. One 32-byte data register is allocated for each the input and the output of the MYVIS. With these registers, the MYVIS receives the current position data of each servo axis and sends the correction data. If the transmission cycle of the machine controller is set to 0.5 ms, 32-byte data will be sent and received according to the timing shown on the right.

The transmission timing of when the MYVIS sends or receives data depends on that of the machine controller. The response time will be between 3 ms and 4.5 ms.




## Components Machine Controllers for Maximum Servomotor Performance

### *MP2000 Series*

With the MP2000 series machine controllers, ideal motion control can be achieved on a wide variety of machines. The controller series utilizes its advantages in three key areas :

- The ability to process large-capacity programs at high speed
- Complete synchronous control of multiple axes
- Improved efficiency in simplified portable programming

MP2300
All-in-one Machine Controller

MP2200
Ideal for Large-scale Systems

MP2500, MP2500M
Touch Panel Controller

MP2100, MP2100M
PCI Type

### High-speed Multi-axis Control

The high-speed CPU used in the MP2000 series shortens the execution time of commands. Also, with the MECHATROLINK-Ⅱ motion network (transmission speed: 10 Mbps) used in the MP2000 series, high-accuracy and high-speed motion control on multiple axes is realized.

### High-level Synchronization

The MP2000 series can be used for synchronous control of multiple axes in various applications and remarkably improve machine precision.

### High Operability

The easy-to-use Windows-based editing techniques of the MPE720 engineering tool enable efficient creation and editing of ladder programs. Also, to shorten the time required for design and maintenance, the efficiency of the methods used for system settings, program management, and displays has been improved.

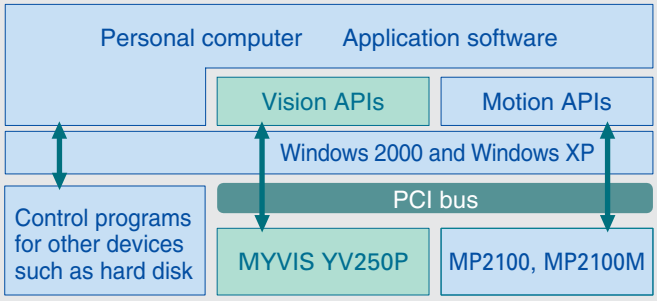
# PCI-bus Type MYVIS System with Personal Computer

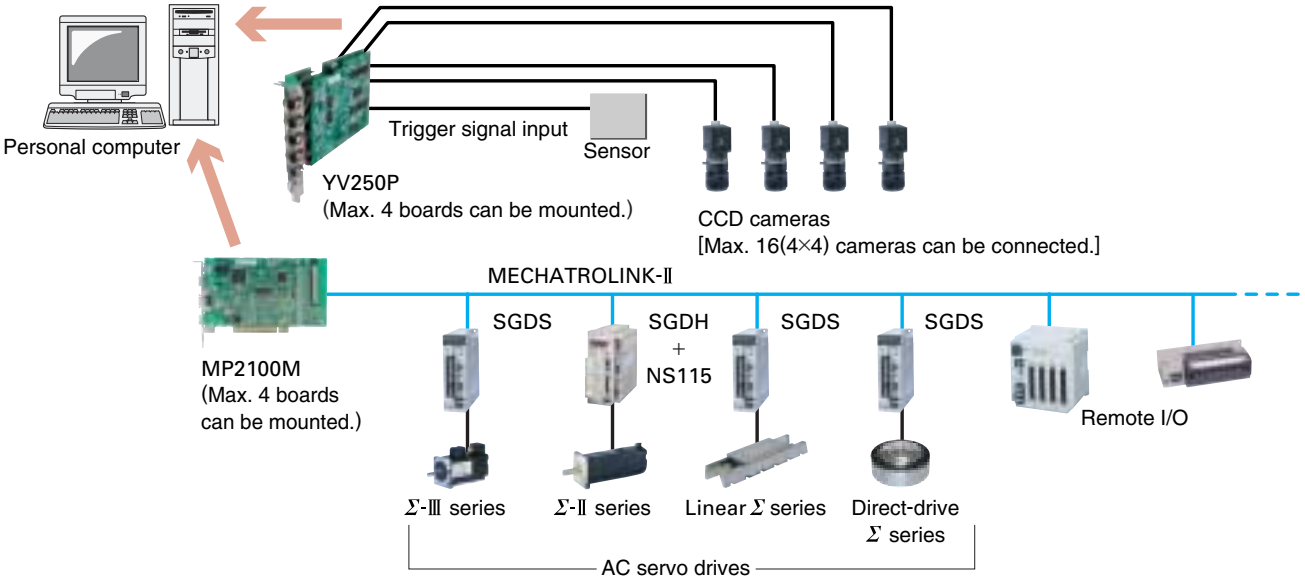
## Using an MP2100 Machine Controller

The PCI-bus type MYVIS attains the same high performance as the standalone type and does not require a separate monitor.

If using a PCI-bus type MYVIS with a Yaskawa machine controller from the MP2100 series, you can create user-application programs for the MYVIS and machine controller under the same development environment. (See the diagram on the right.)

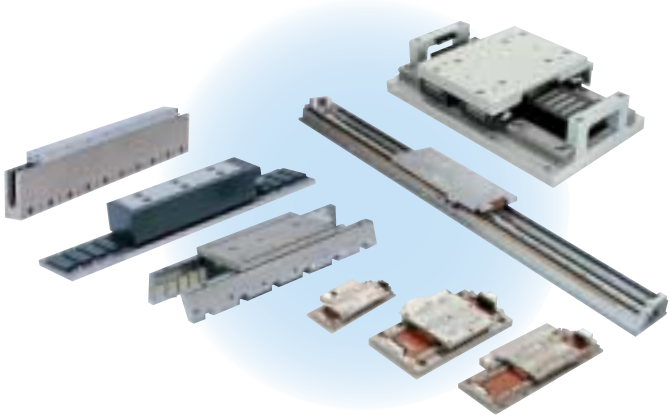
Example of Program Configuration



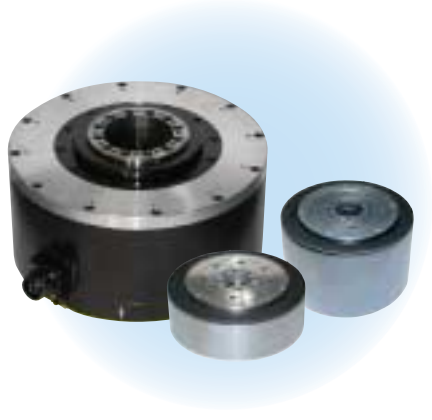

## Servomotors for Maintenance-free, High-accuracy, and High-speed Operation

### *Linear Servomotors*



All Yaskawa linear servomotors, which have been developed using the world's latest linear servo drive technology, can be used to attain the best performance from your machine.
Direct feedback of position data by linear scale signals is used to realize high-speed and high-accuracy positioning. Its simple structure allows cleanliness, low maintenance, and other advantages not possible with a conventional ball-screw system.

### *Direct-drive Servomotors*



The direct-drive servomotors free you from maintenance since the gear-less structure has no vibration or backlash. Direct-drive servomotors are optimal for high-speed and high-accuracy positioning since they require less setup time. There is no degradation of accuracy due to secular change.

## For a standalone MYVIS

Prepare a program using C language for the Super H RISC engine processor and MYVIS program functions.

- Program Development Environments
  Super H RISC engine family C/C++ Compiler Package
- Operating System
  Microsoft Windows 2000 or Windows XP

The system menu is embedded in the MYVIS, so you can easily check the basic functions and performance of the image processing before preparing any application programs.
For debugging, commercially available JTAG code debugger can be used. (Recommended: DH-1200 debuggers manufactured by Bitran Corporation.)

## For a PCI-bus type MYVIS

Prepare a program using any Windows programming languages and MYVIS vision APIs.

- Program Development Environments
  Microsoft Visual C++ Ver.6.0 or Visual C++ . NET
  Microsoft Visual Basic Ver.6.0
- Operating System
  Microsoft Windows 2000 or Windows XP

A Windows-based MYVIS tool is available, so you can easily check the basic functions and performance of the image processing before preparing any application programs.
The standard functions of Microsoft Visual Studio can be used for debugging.

## Program Functions

More than 400 functions for the standalone YV250 and more than 200 for the PIC-bus type YV250P are available.
The following table lists the most commonly used functions.

| Classification | | Function | Function Names for YV250 (Standalone) | API Names for YV250P (PCI bus) |
|---|---|---|---|---|
| Function Setting | Camera function | Selects the image input mode: Frame, Field, or Line. | vset_picture_mode | yvSetCaptureMode |
| | | Selects the image input format for the camera: Normal, Non-interlace, or Double-speed non-interlace. | vset_progressive_mode | yvSetVideoFormat |
| | | Selects the synchronization mode for the camera: External or internal synchronization. | vset_camera_sync_mode | yvSetCameraSyncMode |
| | | Selects the operation mode for the random shutter camera: Sync-reset, sync-nonreset, single VD,or V reset. | vset_random_mode | yvSetRandomMode |
| | | Selects the trigger pulse width to be output to the camera. Range: 8 μs to 16 ms. | vset_trigger_width | yvSetTriggerWidth |
| | Special functions for image input | Selects the image combine mode: vertical split, horizontal split, 3 : 1 split, or composite split. | vset_pic_divide_mode | yvSetPicDivideMode |
| | | Selects the mirror image mode: Disable, cameras 1 & 2, or cameras 3 & 4 cameras. | vset_mirror_mode | yvSetMirrorMode |
| | External trigger signal synchronization | Selects whether to synchronize external trigger signals or not. | vset_trigger_mode | yvSetTriggerMode |
| Image Analysis | Input image | Inputs an image from the camera and store it in the specified memory location. | vpic | yvPic |
| | | Inputs an image from the camera and store it in the specified memory location. Then, create the data of blob perimeter from binary image. | vpic_encode | yvPicEncode |
| | Start input image | Starts inputting an image then switch to next process. | vpic_trigger | yvPicTrigger |
| | | Waits for the current input image to be completely processed. | vwait_pic_end | yvWaitPicEnd |
| | Image data handling | Reads the image data in the specified region of the frame memory. | vget_raw_data | yvGetRawData |
| | | Sets the image data in the specified region of the frame memory. | vset_raw_data | yvSetRawData |
| | | Reads the image data between the set start and end points on the specified line. | vget_raw_on_line | yvGetRawOnLine |
| | Image data pre-process | Rotates the image data in the range specified and write it in another memory location. | vrotate_picture_float | yvRotatePicture |
| | Single template matching | Executes single template matching, and then return the number of matched points. | vmatch | yvMatch |
| | | Reads the coordinates by specifying the number of matched points in the template. | vget_tmpos | yvGetTmPos |
| | | Reads the correlation score by specifying the number of matched points in the template. | vget_tmscore | yvGetTmScore |
| | Template list matching | Executes template list matching. Then, the ID numbers of the found elements, a list of the first character of the element names, and the number of elements are returned. | vtmread_chara | yvTmReadChara |
| | | Reads the list of the correlation score of each element in the template list after matching. | vget_list_score | yvGetListScore |
| | | Reads the list of the positions for each element in the template list after matching. | vget_list_pos | yvGetListPos |
| | Blob analysis | Analyzes connectivity in the specified region of the frame memory, using the data of blob perimeter from the binary image prepared by the hardware when the image is captured. | vanalyze_blob | yvAnalyzeBlob |
| | | Reads the number of detected blobs. | vblob_count | yvBlobCount |
| | | Selects a blob to be read out the data. | vsel_blob | yvSelBlob |
| | Blob features | Reads the blob position in the specified position mode. | vblob_pos | yvBlobPos |
| | | Reads the blob orientation in the specified orientation mode. | vblob_orient | yvBlobOrient |
| | | Reads the features for the area of the blob. | vblob_size | yvBlobSize |
| | | Reads the features for the diameter of the blob. | vblob_rad | yvBlobRad |
| User Parameters | Camera file selection | Selects the number of the camera file to be used for image input and processing. | vsel_camera_file | yvSelCameraFile |
| | Window selection | Selects the variable number of the window to specify the image processing region. | vsel_wind | yvSelWind |
| | Camera environment | Reads the pixel size (X, Y) of the specified camera file. | vget_pix_size | yvGetPixSize |
| | Binary image conditions (BLREG) | Sets a threshold level for the specified BLREG(Binary Level Register). | vset_binary_level | yvSetBinaryLevel |
| | Density conversion (LUT) | Sets the look-up table (LUT) number for the specified camera file. | vset_input_mode | yvSetLut |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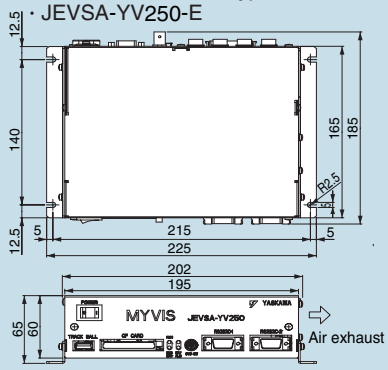
## Standard Specifications

| Item | | Standalone | | | PCI-bus type |
|---|---|---|---|---|---|
| | | Unit with standard specifications | Unit with CE marking | Board type | |
| Model | | JEVSA-YV250 | JEVSA-YV250-E | JAVSA-YV250S | JAVSA-YV250P-E |
| Image processing | | Gray scale pattern matching, binary image analysis | | | |
| CPU | | SH-4 (240 MHz) | | | |
| Image processing LSI | | Yaskawa-developed ASIC | | | |
| Memory | Application program | 512 KB flash memory | | | Computer application program |
| | Backup memory | 256 KB CMOS (for saving parameters) | | | None (Uses memory of computer.) |
| | Template storage memory | CF cards (512 MB max.), Required as external memory (Sold separately.) | | | None (Uses memory of computer.) |
| | Image memory-frame memory | 640×480×8 bits×48 images | | | |
| | Image memory-template memory | 4096×512×8 bits×1 image | | | |
| | Field memory for display | 640×480×8 bits×1 image | | | 640×480×8 bits×2 images |
| Image input | Camera Interface | EIA or non-standard analog camera interface×4 (New EIAJ 12-pin connector), 12-VDC power supply, and 250 mA max. per camera. | | | |
| | Camera sync mode | Internal/external sync | | | |
| | Camera type | Normal camera (2 : 1 interlace) | | | |
| | | Camera that reads all pixels non-interlace 30 Hz, 60 Hz | | | |
| | Random trigger shutter supported | Sync-nonreset, sync-reset, single VD or V reset, changeable trigger polarity and pulse width, and changeable WEN polarity. | | | |
| | A/D conversion | Two A/D conversion circuits (8-bit lookup table), Simultaneous image capture on two channels is possible. | | | |
| Monitor | D/A conversion | Three D/A conversion circuits (8-bit lookup table) | | | – |
| | Monitor output | NTSC B&W (BNC) or VGA (15-pin D-sub) | | | Transfers image data by DMA transfer via PCI bus. |
| | Image display | Full screen for one camera, composite screen for two cameras, simultaneous reduction for two or four cameras, mirror display, and binary display | | | |
| I/O | Network | MECHATROLINK-Ⅰ/Ⅱ, Ethernet (10BASE-T) | | | – |
| | Serial | RS-232C×2 ch (9 pin D-sub) 1200 bps to 115200 bps | | | – |
| | Track ball | USB mouse | | | – |
| | Parallel | 16 general-purpose inputs and 4 specific inputs<br>16 general-purpose outputs and 2 specific outputs<br>Photocoupler insulation (Not for mode switching signal of specific inputs) | | | 3 inputs (can be used as an external trigger signal)<br>1 output<br>Photocoupler insulation |
| Power supply | | 100 VAC ±10% 50/60 Hz<br>Maximum rating: 30 VA | 24 VDC ±20%<br>Current consumption: 1.2 A | 5 VDC +5% −3%<br>Current consumption: 2.0 A<br>12 VDC ±1 V<br>Current consumption: 0.1 A<br>(not including current consumption used for cameras) | 5 VDC±5% (supplied by PCI bus)<br>Current consumption: 1.2 A<br>12 VDC ±1 V (for camera power supply)<br>· Max. 0.5 A can be supplied by PCI bus.<br>· For 0.5 A or more, use the Floppy-disk Drive power cable of the computer. |
| Approx. mass | | 2.0 kg | 2.0 kg | 0.5 kg | 0.2 kg |
| Operating environment | Ambient temperature | 0 to +50℃ | 0 to +50℃ | 0 to +55℃ | 0 to +55℃ (Computer internal temperature) |
| | Humidity | 35% to 90% (no condensation) | | | |

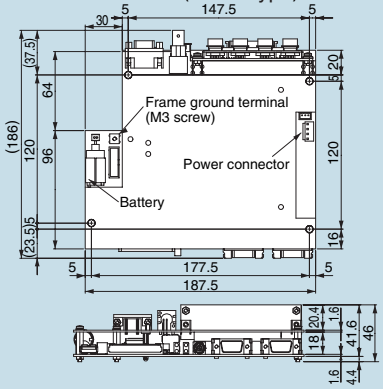
## Dimensions Units: mm

### Standalone*

· JEVSA-YV250(Unit type)
· JEVSA-YV250-E

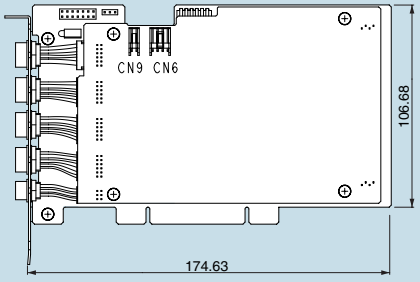



· JAVSA-YV250S(Board type)



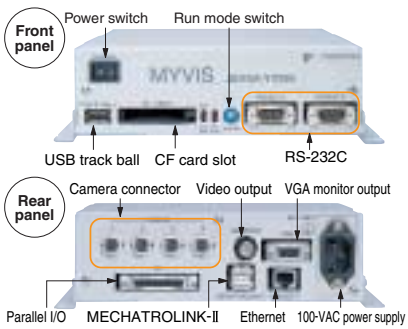

### PCI-bus Type

· JAVSA-YV250P-E
(Half the size of a standard PCI)




*: For more details, please visit our website to download dimensions in PDF or DXF file format.
http://www.e-mechatronics.com/mc/index.html

## Names of Parts:Standalone Unit Type




The shape of the power connector for the JEVSA-YV250-E model is different from the one pictured.

## Product List

| | Name (Short Name) | Model | Description |
|---|---|---|---|
| MYVIS | Unit with standard specifications (YV250) | JEVSA-YV250 | With a three-pin, 100-VAC power cable. |
| | Unit with CE marking (YV250-E) | JEVSA-YV250-E | Requires a 24-VDC power cable. |
| | Board type (YV250SB) | JAVSA-YV250S | Requires 5-VDC and 12-VDC power cables. |
| | PCI-bus type (YV250P) | JAVSA-YV250P-E | Requires one half-size PCI slot in the computer. |
| Software | Program-development software package for standalone MYVIS | JZVSA-FV250 | Floppy disk; contains a header file, a library, and a section definition file. |
| | Program-development software package for PCI-bus MYVIS | JZVSA-CD250P | CD-ROM; contains a header file, APIs, a driver, tool software, and a user's manual. |
| | Communications software (MYVISCOM) | JZVSA-FV36 | For data transmissions between the standalone MYVIS and computer. |
| Cable | Power cable for YV250-E* | JZVSA-C25-E | For 24-VDC power supply, cable length: 2 m |
| | Power cable for YV250SB* | JZVSA-C24 | For 5-VDC and 12-VDC power supplies, cable length: 2 m |

*: Contact Yaskawa Controls, Co., Ltd for orders.

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